

WHAT IS CLAIMED IS:

1. A discharge device for worked material, which is disposed in a press working apparatus for applying a press working to a material through a vertical reciprocating motion of an upper die relative to a lower die and which is operable to discharge a worked material produced resultantly from the press working, said device comprising:

a chute adapted to receive the worked material produced resultantly from the press working and to discharge said worked material to the outside of said press working apparatus by making a reciprocating motion within a substantially horizontal plane; and

a drive means for driving said chute in response to the vertical reciprocating motion of said upper die, wherein

said drive means is adapted to drive said chute such that at a moment of stopping of the chute, a force exerted on the worked material in association with a movement of the chute in a direction of the chute movement is greater than a force exerted on the worked material based on a frictional force between said worked material and said chute in a direction opposite to said direction of the chute movement.

2. A discharge device for worked material, which is disposed in a press working apparatus for applying a press working a material through a vertical reciprocating motion of an upper die relative to a lower die and which is operable to discharge a worked material produced resultantly from the press working, said device comprising:

a chute adapted to receive the worked material produced resultantly from the press working and to discharge said worked material to the outside of said press working apparatus by making a reciprocating motion within a substantially horizontal plane; and

a drive means for driving said chute in response to the vertical reciprocating motion of said upper die, wherein

said drive means is adapted to drive said chute such that at a moment of starting of its driving operation, a force exerted on the worked material in association with a movement of the chute in a direction of the chute movement is greater than a force exerted on the worked material based on a frictional force between said worked material and said chute in a direction opposite to said direction of the chute movement.

3. A discharge device for worked material in accordance with claim 1 or 2, in which said drive means comprises:

a cam member and a follower member which are arranged in contact with each other and are operable to convert a downward movement of said upper die to a forward movement of said chute in one direction within a substantially horizontal plane; and

a resilient member, which is operable to bias said chute to make a backward movement in other direction opposite to said one direction of said forward movement when said cam member is disengaged from the contact with said follower member.

4. A discharge device for worked material in accordance with claim 3, in which said chute comprises a receiving plate, said receiving plate having a receiving surface for receiving said worked material that has dropped thereon and an hit wall upon which said worked material hits during said forward and backward movement of said chute, wherein a plurality of pairs of said receiving surface and said hit wall are arranged in series to define a step-like configuration of the receiving surfaces of the receiving plate.

5. A discharge device for worked material in accordance with claim 4, in which said receiving surface is inclined upward by a predetermined angle relative to a substantially horizontal plane.

6. A discharge device for worked material in accordance with claim 4 or 5, in which said receiving surface includes a through-hole or a mesh formed therethrough.

7. A discharge device for worked material in accordance with claim 6, said device further comprising a lower chute located below said chute and including a receiving plate for receiving said worked material that has been discharged through said through-hole or mesh, and a lower drive means for driving said lower chute to move forward and backward within a substantially horizontal plane in response to the vertical reciprocating motion of said upper die, said receiving plate of said lower chute comprising a receiving surface and a hit wall upon which said worked material hits during said forward and backward movement of said lower chute.

8. A discharge device for worked material in accordance with claim 4, in which a connection between said follower member and said chute is in a plane substantially coplanar with said receiving surface of said receiving plate.

9. A discharge device for worked material in accordance with claim 3, in which

said follower member comprises:

a follower bracket to be attached to said lower die;

an actuator member which is pivotally mounted on said follower bracket via a follower pivot pin so as to be rotatable in a vertical plane and includes an input protrusion protruding in one side of a pivotally supported portion thereof by said follower bracket; and

a follower resilient member for biasing said actuator member

to a direction, with respect to the rotational directions of said actuator member, opposite to the discharging side of said worked material, and said cam member comprises:

a mounting bracket to be attached to said upper die;

a cam body suspending from said mounting bracket via a cam pivot pin so as to be rotatable in a vertical plane; and

a cam resilient member for biasing said cam body to a direction, with respect to the rotational directions of said cam body, opposite to the discharging side of said worked material, wherein

a stopper is provided in a root portion of said cam body for prohibiting the rotation of said cam body to a direction, with respect to the rotational directions of said actuator member, toward the discharging side of said worked material, and

an input pin is mounted on a front end portion of said cam body, which is to come into contact with said input protrusion of said actuator member and is placed in a point offset from a position just below said cam pivot pin to a direction, with respect to the rotational directions of said cam body, opposite to the discharging side of said worked material.